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PROPRANOLOL: A SPECIFIC ANTAGONIST TO SUB ACUTE COCAINE INTOXICATION

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INTRODUCTION

In the clinical treatment of over fifty cases of "over-dose" with cocaine, the authors have become aware of the strikingly specific antagonistic effects of propranolol HCl (Inderal^R) on the manifestations of central cardiovascular hypermetabolism.

Time after propranolol (min.)	Blood pressure (mm. Hg)	Pulse rate (min. ⁻¹)	Respiration (min. ⁻¹)
3	130/90	118	28
5	130/88	110	26
15	120/80	90	24
30	110/70	84	20

CASE-REPORT: A

The patient was a 28-year-old, well-developed, Caucasian blue-collar, outdoor, heavy laborer. Past medical history revealed childhood "asthma" and several episodes of childhood "pneumonia." There had been no further history of problems of this nature for over ten years. History of drug habits revealed a rather heavy intake of beer, consisting of from six to twelve bottles per day. When seen at a "rock concert" he reported that he had drunk over six bottles of beer that day, had smoked two "joints," and had just done two amyl nitrite "poppers." He appeared rather giddy, was pale, sweaty, and obviously intoxicated. He was reported to have just snorted several "lines" of "good coke" (translated here as 200 mg. cocaine), after which he became tremulous, nauseous, and faint. When initially seen, his blood pressure was 140/90 mm. Hg; his pulse rate was 130/min., and his respirations, 36/min. He was notably tremulous and anxious at this time. After a further two minutes, he was given 2 ml. of propranolol hydrochloride intravenously. Subsequent blood pressure readings and pulse and respiration rates 2 ml. (2 mgm.) of propranolol hydrochloride intravenously and 80 mgm. p.o. Subsequent blood pressure readings and pulse and respiration rates were:

He reported that he was much more relaxed but was still "high on coke." He was released to the care of his friends. At this time he appeared visibly calm, rational, and in control of his motor and sensory facilities. He was subsequently seen on several occasions in the crowd, dancing to the music, and apparently in need of no further medical intervention.

OBSERVATIONS: This patient was noted to reflect the typical lytic effects of Inderal on blood pressure and pulse as noted with other case reports. The Inderal appeared to have little effect on pupil size or upon degree of "wiredness". The patient remained quite active although not unduly apprehensive until about 1:20 A.M. at which time he retired and experienced a good night's sleep.

CASE-REPORT: B

The subject was a 34-year-old, white male who worked at heavy, outdoor labor. Past drug history revealed frequent marijuana and alcohol usage; his intake of beer was approximately six to twelve bottles a day; his intake of grass was about two to three joints per day. When seen, he was "hung over"; he had taken two joints of grass and about three or four beers that afternoon. He appeared slightly intoxicated. He gave

a past history of childhood asthma, which he stated he had overcome by his own will power. When first examined, he had been running on the beach and appeared somewhat out of breath and diaphoretic. At 6:10 P.M. when first examined, his BP was 160/90; his pulse was 100; his respirations were 32. At 6:12 he snorted 200 milligrams of cocaine. At 6:15 his BP was reported as 150/100; his pulse rate 120; his respirations were 32. At 6:25 his BP was noted as 120/70; his pulse rate, 120; his respirations were 30. At 6:33 his BP was noted as 140/76; his pulse rate, 120; respirations, 28. At 6:37 his BP was 140/100; his pulse rate, 120; his respirations, 28. At 6:38 he received 2 ml. of Inderal I.V. At 6:45 his BP was 126/90; his pulse rate was 100; his respirations were 28. At 6:50 his BP was 120/80; his pulse rate was 84; his respirations were 24. At 7 P.M. his BP, 120/80; his pulse rate was 84; his respirations were 24.

OBSERVATIONS: This patient would appear to have been slightly "out of shape" and slightly intoxicated with beer prior to the experiment. His personal observations were that it was "pretty good coke," but he missed the "wired" effect which contributed to his own subjective high.

CASE-REPORT: C

The subject was a 28-year-old, white male who worked as a heavy, outdoor laborer, but who displayed extreme craftsmanship with wood. Past medical history revealed a childhood asthma and several episodes of childhood pneumonia, which he stated were life-endangering. Current drug habits consisted of a rather heavy intake of beer, mainly in the evening and consisting of six to twelve bottles. When seen, he reported that over the last twelve hours he had drunk over six bottles of beer, had smoked two joints, and had done two amyl nitrite "poppers." He appeared rather light-hearted, but not euphoric and not intoxicated. At 6 P.M. in the resting state, his blood pressure was 130/90; pulse was 120; respirations, 14. At 6:04 he snorted 200 milligrams of cocaine. At 6:05, his pulse was 126. At 6:10 his blood pressure was 140/90; his pulse was 130; his respirations were 30. At 6:15 his BP was 130/94; his pulse rate, 140; respirations, 36. At 6:25 his BP was 140/90; his pulse rate, 140; his respirations, 36. At 6:29 his pulse rate was 135. At 6:30 he received 2 ml. of Inderal. At 6:32 his blood pressure was 130/90, his pulse 118, his respiration 28. At 6:35 his BP was 130/88, pulse rate 110, respirations 26. At 6:43 his BP was 120/80, his pulse rate 100, his respiratory rate was 26, he developed a "pounding headache". At 6:47 he received an additional 2 ml. of Inderal. At 6:50 his BP was reported as 120/80; his pulse was 96. At 6:50 his BP was 120/80; his pulse was 90; his respirations were 24. At 7 P.M. his BP was 110/72; his pulse was 84; his respiratory rate was 24.

OBSERVATIONS: At 7 P.M. the patient was noticed to be relatively relaxed, but reported subjectively that he was really "high" on "coke."

CASE-REPORT: D

The subject was a 26-year-old, white female who worked at a clerical job. Past medical history was unremarkable. Current drug intake consisted of daily alcohol and grass in moderate amounts. She reported having several beers and a joint that day, but did not appear in any way intoxicated. At 6:15 P.M. her BP was reported as 120/88; her pulse rate was 84; her respirations were 18. At 6:17 she snorted approximately 200 milligrams of cocaine. At 6:20 her BP was 130/90; her pulse rate was 100; her respirations were 28. At 6:25 her BP was 120/90; her pulse rate was 100; her respirations were 28. At 6:34 her BP was 120/70; her pulse rate was 80; her respirations were 26. At 6:40 she was to receive 2 ml. of Inderal. She expressed some apprehension at receiving an intravenous shot at that time. Her vital signs were: BP 120/80, pulse rate 120, respirations 28. At 6:41 she received 2 ml. of Inderal I.V. At 6:45 her BP was 110/80; her pulse rate was 84; her respirations were 24. At 6:52 her BP was 110/80; her pulse rate, 84; her respirations, 22. At 7 P.M. her BP was 110/70; her pulse rate, 80; her respirations were 18.

OBSERVATIONS: This subject felt that having her vital signs monitored took away somewhat from the pleasure of a cocaine high. She also reported that she was a cocaine snorter and that the appearance of the needle was very frightening to her.

CASE-REPORT: E

The subject was a 44-year-old unemployed artist of medium build and good general health. Drug habits included moderate alcohol intake and occasional marijuana in social situations. He was a non-smoker. At 6:05 P.M., blood pressure was noted to be 132/90; pulse, 64; respirations, 16. At 6:10 P.M. 200 milligrams of cocaine were taken by way of the nasal route. At 6:18 a blood pressure of 142/94, a pulse of 60, and respirations of 20 were noted. At 6:30 blood pressure was 142/98; pulse, 68; respirations, 24. The patient was noted to be euphoric, in a high and excited mood, and talkative. His feelings were reported to be sharp and alert. There was no nausea and no urge to defecate or urinate. At 6:40 the blood pressure was 148/94; pulse was 68; respirations, 26. At 6:50 the blood pressure was 150/96; pulse, 60; respirations, 20. The pupils were noted to be dilated to 6 millimeters. The hands were cold; feet were cold; and mouth was dry. At 6:55 an additional 100 milligrams of cocaine was taken by nasal route. At 7:00 P.M. the patient was noted to be jittery; a foot tapping was noted. A slight headache was reported. A non-intention tremor of the right hand was noted. At 7:05 blood pressure was 150/98; pulse was 60; respirations, 20. At 7:15 the blood pressure was 178/112; the pulse was 70. The patient reported that he felt psychically lifted, that he felt euphoric and excited. Rapid eye movements were noted, as were rather random and rapid mouth movements. The nailbeds were blanched; the skin was pale and dry. At 7:25 the blood pressure was 170/110; the pulse was 56; respirations,

24. At 7:25 an amyl nitrite vaporole was inhaled. At 7:26 the blood pressure was reported as 180/90; the pulse was weak and thready and sporadic at approximately 160 per minute. It was not palpated well, peripherally. At 7:28 the pulse was 140 and bounding. At 7:29 the pulse had returned to 64. The patient did not lose consciousness but appeared to be quite euphoric and high during this interval. At 7:30 visual patterns of a paisley nature were reported; patient reported that these were not as clear as seen with mushrooms or acid. At 7:35 the blood pressure was 146/90; the pulse was 60. At 7:35 100 milligrams of cocaine was given intravenously. At 7:40 the patient reported that his ears were ringing and that there was a dizzy rush. His feet were noted to be moving in a tapping motion. Pulse was 72. At 7:40 the blood pressure was 160/100; the respirations were 28. The mouth was reported as quite dry. The patient reported that he was unable to do anything; he could only sit; he was too dizzy to get up and move about. The right hand was noted to be involuntarily shaking. The patient was generally noted to be tremulous. The legs were moving. The patient appeared unable to focus his eyes; the pupils remained dilated at 6 millimeters. The patient reported that he was slightly queasy. He stood up, moved about, appeared sweaty. He reported colored spots before his eyes. There was little ataxia, and his gait was relatively normal. At 7:47 the blood pressure was 180/112; pulse, 60. The patient reported that his throat was so dry that speech was quite difficult. He also reported a need to hyperventilate at this time. Respirations were 16. The patient reported that the "zang" rush was decreasing. The eyes were then able to focus and to read newsprint. The headache was reported to persist. There was slight teeth grinding noted. The jaw was reported to ache. Feet were noted to be tapping, and hands and fists were clenched. Colors were reported to be intense. The patient was questioned about thoughts of sex, and reported that there was none. He further reported that as his attention was brought to this subject, his thoughts were increasing and he felt a pelvic rush of blood. A slight sick headache and slight nausea were reported at this time. At 7:55 blood pressure was 166/96; pulse, 62; respirations, 24. The pupils were dilated at 6 millimeters. There was no photosensitivity noted. The patient's color had improved to a pinkish color. He was up and moving around, although he appeared jittery and "wired." Pupils were noted to be 5 millimeters. At 8:06 blood pressure was 160/100; pulse was 60 and somewhat thready. At 8:14 an amyl nitrite vaporole was inhaled once again. A pulse rate of 140 was immediately noted, which dropped to 120; and by 8:16 the pulse had returned to 60. The euphoric effect as previously reported was again noted. The blood pressure at 8:16 was 160/90. At 8:18 P.M. 1 ml. of Inderal was given intravenously. The pulse rate was noted to be 58. At 8:19 an additional 1 ml. of Inderal was given intravenously; patient reported that his head was clearer. At 8:20 1 ml. of additional Inderal was given intravenously; the patient reported that he felt much more pleasant. The blood pressure was 156/88; the pulse was 44. Less headache was reported. The patient reported that he was "stoned," but without side effects. The pupils were widely

dilated at 6 millimeters. Patient reported that he was less nauseated. At 8:25 the blood pressure was 150/80; the pulse, 44. At 8:31 1 ml. of additional Inderal was given. The blood pressure was noted to be 150/80. The patient reported that he felt more coordinated and less jumpy. At 8:35 an additional 1 ml. of Inderal was given intravenously. The blood pressure was reported as 148/88; the respiration, 16; the pupils, 6 millimeters. At 8:40 an additional amyl nitrite vaporole was inhaled. The pulse was 52 at that time; it immediately became quite rapid, thready, and weak; and within two minutes it had returned to a strong, bounding 48 per minute. The patient reported that his mouth was much less dry. At 8:43 the blood pressure was 140/94; the pulse was 48; the respirations were 16. The patient reported that he felt much less irritable and, in general, much more comfortable.

OBSERVATIONS: This patient was noted to reflect the typical lytic effects of Inderal on blood pressure and pulse as noted with other case reports. The Inderal appeared to have little effect on pupil size or upon degree of subjective "wiredness." The patient remained quite active, although not unduly apprehensive, until about 1:30 A.M.—at which time he retired and experienced a good night's sleep.

* * * * *

We have found, in over 50 cases, that propranolol specifically and safely reverses the cardiovascular pressor effects of cocaine (i.e., amphetamine tachycardia) that place patients who are taking this drug at risk. Central cardiovascular hypermetabolism is the most serious consequence in a patient who has taken cocaine, either as a casually self-administered drug or as a topical anaesthetic before endoscopy. The classical cocaine reaction—with initial stimulatory effects followed, sometimes, by profound depressant action—can often confuse the physician. Once this potential crisis has passed and it is clear that one is indeed faced with a case of *chronic toxicity* (the "over-amped," "wired" individual with the cocaine "leaps"), then prompt intervention is indicated, for it is this patient at this time who is the prime candidate for cerebrovascular accident. A possible management problem sometimes being a danger to himself, imminent death from a CVA, cardiac arrhythmia possible but very infrequent in non-institutionalized cocaine "shooters", or high-output congestive heart failure.

In our experience, unique in its accessibility to an illicitly using cocaine population, we have found the following regimen to be effective and safe—namely, 1 mg. propranolol hydrochloride/min. intravenously (up to a maximum dose of 8 mg. in our series) with continuous cardiovascular monitoring. This immediately reverses the hypertension and tachycardia (and tachypnoea); one must be ever-mindful of the hyperthermia (hyperpyrexia) attendant on the use of all sympathomimetic agents.

